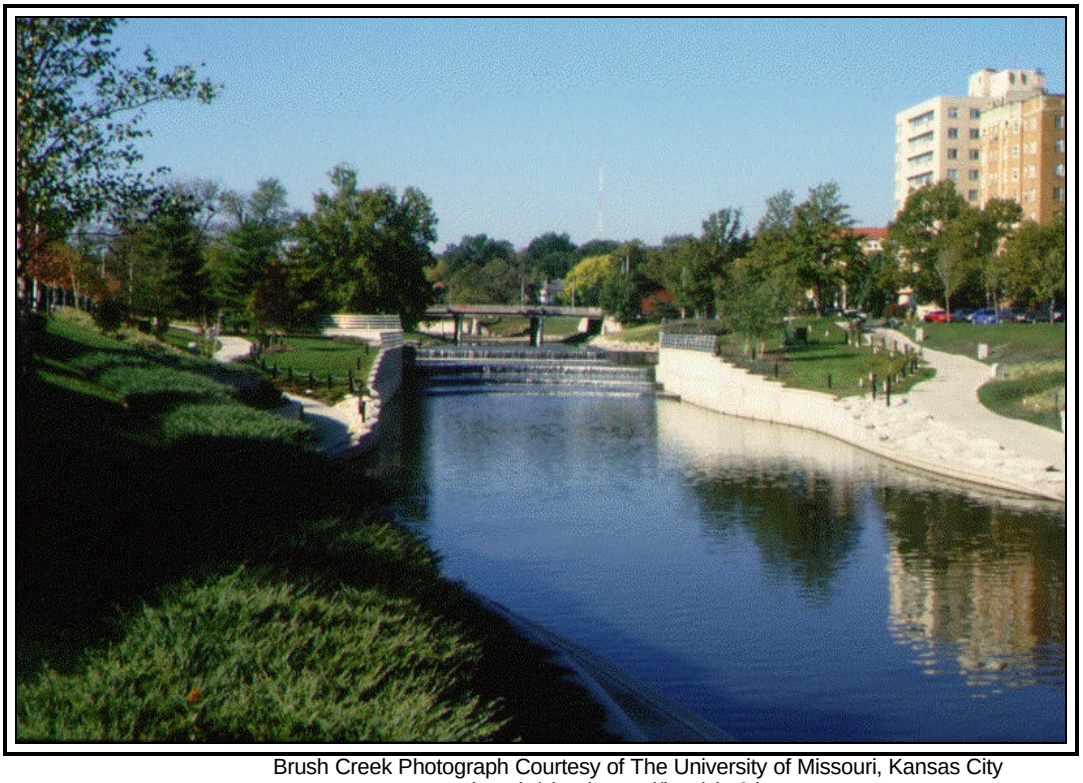
A Watershed Conditions Report For the State of Kansas
HUC 10300101
(LOWER MISSOURI-CROOKED) Watershed



Brush Creek Photograph Courtesy of The University of Missouri, Kansas City
www.umkc.edu/sites/env.sci/bcrt/site8.htm

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Watershed Conditions Report
For
HUC 10300101 (LOWER MISSOURI-CROOKED)

Prepared by
Kansas Department of Health and Environment (KDHE)
Nonpoint Source Section
12/4/01

EXECUTIVE SUMMARY

This Watershed Conditions Report is designed to serve as a water quality "atlas", and is intended to provide stakeholders in water quality with a tool to assess the condition of water resources within their watershed. Surface water quality for HUC 8 10300101streams and rivers is generally in poor condition with majority of the surface water bodies not supporting their designated uses. The primary pollutant concern within HUC 8 10300101 streams and rivers is fecal coliform bacteria (FCB). Fecal coliform bacteria is found in the digestive systems of warm blooded animals. In the environment coliform bacteria is an indicator of potential disease producing organisms. Additional pollutants in this watershed are ammonia, nutrients and chlordane. Ammonia is a chemical toxic to fish and other aquatic organisms. Chlordane is a pesticide often used for termite control. Potential sources of chlordane come from urban and suburban areas.

There are several small lakes and ponds within HUC 8 10300101. The primary pollutant concern for lakes within this watershed is chloride. Chloride is an inorganic mineral, which may cause adverse water taste, deterioration of plumbing and hypertension in humans. Additional pollutant concerns for lakes within the watershed include low flow and eutrophication.

Groundwater resources in HUC 8 10300101 include a few alluvial aquifers of the Negro Creek and Indian Creek and portions of the Glacial Drift aquifer in the bordering counties. Water from these aquifers is very hard with naturally occurring minerals and nitrate as the primary pollutant concerns.

PURPOSE

The Watershed Conditions Report is designed to serve as a water quality "atlas" for a given watershed, and is intended to provide Watershed Stakeholders Committees (WSC) with a tool to assess the condition of water resources within their watershed.

BACKGROUND

The Clean Water Act mandates that States assess the quality of their waters and implement Total Maximum Daily Loads (TMDLs) for water bodies that do not meet their designated uses. The following is a summary of steps taken by the State of Kansas to comply with these requirements of the Clean Water Act.

The Kansas Department of Health and Environment (KDHE) prepared the Kansas Unified Watershed Assessment in 1998. This assessment classifies the State's watersheds into four categories. A Category I classification means the watershed is in need of restoration due to having water quality impairments or degradation of other natural resources related to an aquatic habitat, ecosystem health and other factors related to aquatic life resources. Category II watersheds are in need of protection. Category III are watersheds with pristine or sensitive aquatic system conditions on lands administered by federal, state, or tribal governments. Category IV watersheds are those for which there is insufficient data to make accurate classification. KDHE has assigned a restoration priority score to each Category I watershed.

As mandated by section 303(d) of the Clean Water Act, lakes and streams within the Category I watersheds, which do not meet water quality standards, are published biannually in the 303(d) list. Subsequently, lakes and streams which appear on the 303 (d) list are scheduled to have a Total Maximum Daily Load (TMDL) prepared. KDHE is currently preparing TMDLs for impaired stream segments located within the highest restoration priority watersheds.

To restore water quality within the Category I watersheds, KDHE recommends the implementation of a Watershed Restoration and Protection Strategy (WRAPS). The ultimate goal of the WRAPS process is to create and implement a plan to restore the health of water bodies that do not meet their water quality standards. Additionally, the WRAPS process will insure that water bodies that currently meet their water quality standards are protected.

KDHE recommends that the WRAPS process be implemented on a local level by a Watershed Stakeholders Committee (WSC). The WSC would have the responsibility of working with local and state agencies to develop a WRAPS plan. This plan should identify the following: public outreach methods; required monitoring activities based on water quality goals and outcomes; specific water quality problems; watershed coordinator/evaluator; actions to be taken to achieve water quality goals and outcomes; schedule for implementation of needed restoration measures; and funding needs.

Streams and Rivers

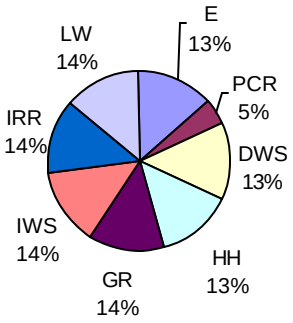
The Huc 8 10300101 watershed is ranked thirty-second in priority for watershed restoration throughout the state. According to the Unified Watershed Assessment, 83.4% of the total miles of water in this watershed do not meet their designated uses. This watershed includes the Blue River, Brush Creek and several other streams and creeks. See Attachment 1 for a map of streams and rivers in HUC 8 10300101.

Designated Uses

As shown in figure 1, surface waters in this watershed are generally used for groundwater recharge, industrial water supply, irrigation use and domestic water supply. There are no public water supplies within the watershed.

Figure 1

Surface Water Uses



- HH=Human Health
- PCR=Designated for contact recreational use
- DWS=Designated for domestic water supply use
- GR=Designated for ground water recharge
- IRR=Designated for irrigation use
- IWS=Designated for industrial water supply use
- LW=Designated for livestock use
- E=Expected Aquatic Life

TMDL/Contaminate Concerns

Streams and rivers throughout Kansas have been sub-divided into segments. By dividing the streams and rivers into segments they can be better analyzed and understood. A reach of river or stream may have segments which vary greatly in water quality, based on surrounding land uses. The figures below display the impairments of the streams and rivers based on the number of segments sampled.

Surface waters not meeting their designated uses will require total maximum daily loads (TMDLs). Figure 2 shows 56% of the stream/river segments sampled need TMDLs. Streams/river segments in this watershed are impaired by fecal coliform bacteria (FCB), ammonia (NH3), nutrients, and chlordane (CHLORD). Approximately 58% of the streams/rivers sampled in this watershed are impaired by FCB, 14% are impaired by chlordane, 14% have excess nutrients, and 14% are impaired by NH3.

Figure 2

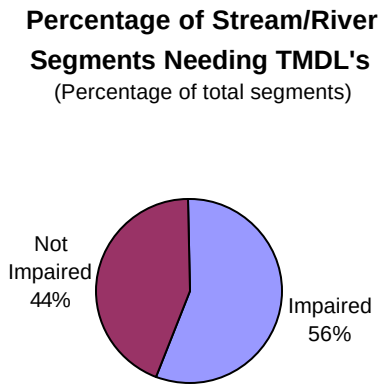
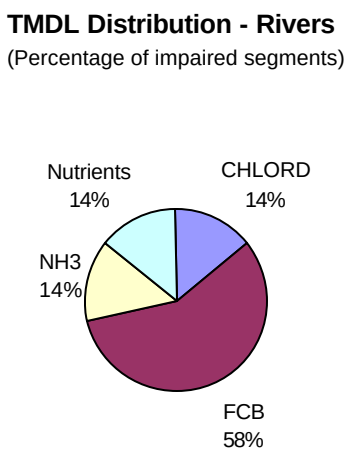


Figure 3



Land Use

Land use composition can have a significant affect on the types and quantity of nonpoint source pollutants in the watershed. Below are a list of the land uses in this watershed which can affect a stream or river segment. Grassland is considered grazingland for livestock.

- **p** Urban Area…. 46.0%
- **p** Row Crop…. 13.0%
- **p** Grassland…. 33.0%
- **p** Wooded Area…. 6.0%
- **p** Water Area…. 0.0%
- **p** Other…. 0.0%

Potential Pollution Sources

FCB is a bacteria present in human and animal waste. It serves as an indicator of potential disease causing organisms. Possible sources of FCB include feedlots, livestock, some older wastewater treatment facilities, septic systems, and wildlife. Chlordane is a pesticide often used for termite control. Potential sources of chlordane may be caused from urban and suburban areas. Ammonia is a chemical which is toxic to fish and other aquatic organisms. Potential sources of ammonia include livestock, septic systems, wildlife, and wastewater facilities. Nutrients may be a result from wastewater treatment plants, row crop agriculture, livestock, fertilizer, septic systems and wildlife. Increased nutrients in water bodies may be sufficient enough to interfere with designated water uses.

Feedlots: In Kansas, confined animal feeding operations (CAFOs) with greater than 300 animal units must register with KDHE. There are approximately 6 registered CAFOs located within HUC 8 10300101 (this number, which is based on best available information, may be dated and subject to change). Waste disposal practices and wastewater effluent quality are closely

monitored by KDHE for these registered CAFOs to determine the need for runoff control practices or structure. Because of this monitoring, registered CAFOs are not considered a significant threat to water resources within the watershed. A portion of the State's livestock population exists on small unregistered farms. These small unregistered livestock operations may contribute a significant source of fecal coliform bacteria and nutrients, depending on the presence and condition of waste management systems and proximity to water resources.

Wastewater Treatment Facilities: There are approximately 6 municipal and industrial wastewater treatment facilities within the watershed (this number may be dated and subject to change). These facilities are currently regulated by KDHE under National Pollutant Discharge Elimination System (NPDES) permits. These permits specify the maximum amount of pollutants allowed to be discharged to the "waters of the State". Due to the chlorination processes involved in municipal waste treatment, these facilities are not considered to be a significant source of fecal coliform bacteria; however they may be a significant source of nutrients.

Septic Systems: There are currently thousands of septic systems within the watershed and this number is increasing. When properly designed, installed, and maintained, septic systems can act as an effective means of wastewater treatment. However, poorly maintained or "failing" septic systems can leach pollutants into nearby surface waters and groundwater. The exact number of failing septic systems within the watershed is unknown; however the number may be increasing due to the current trends in suburban development. Local Environmental Protection Programs and County health departments may provide excellent sources of information regarding the proper design, installation, and maintenance for septic systems.

Wildlife: Wildlife located throughout the watershed are not usually considered a significant source of nonpoint source pollutants. However, during seasonal migrations, concentrations of waterfowl can add significant amounts of fecal coliform bacteria and nutrients into surface water resources.

Row Crop Agriculture: As stated above, approximately 13% of the watershed's land is used for row crop agriculture. Row crop agriculture can be a significant source of nonpoint source pollution. Common pollutants from row crop agriculture include sediment, nutrients, pesticides, and fecal coliform bacteria. Many producers within the watershed regularly implement and maintain BMPs to limit the amount of nonpoint source pollutants leaving their farm. Some common BMPs include: the use of contour plowing; use of cover crops; maintaining buffer strips along field edges; and proper timing of fertilizer application.

Urban/Suburban Runoff: Many urban landscapes are covered by paved surfaces including roads, driveways, parking lots, and sidewalks. These surfaces are impermeable and tend to divert water into storm drains at high velocities. This increased flow velocity from urban areas can cause severe stream bank erosion in receiving water bodies. Additionally, urban and suburban runoff may carry other pollutants like petroleum hydrocarbons and heavy metals. Currently, the watershed is only about 46% urban. Limiting paved surfaces is the key to slowing urban nonpoint source pollution. The use of grass swales, open spaces, and storm water retention ponds are recommended to slow runoff in urban areas.

The watershed has an increasing population living in suburban areas. Residential landscapes are often designed with large turf areas which require high amounts of water and chemicals to maintain. The use of excessive amounts of fertilizers and lawn care chemicals in residential areas can contribute a significant amount of pollution to nearby water resources. Suburban nonpoint source pollution can be limited by: using less lawn fertilizers and chemicals; control of construction sites; proper disposal of pet waste; establishing large areas of native vegetation; and conserving the amount of water use for plant maintenance.

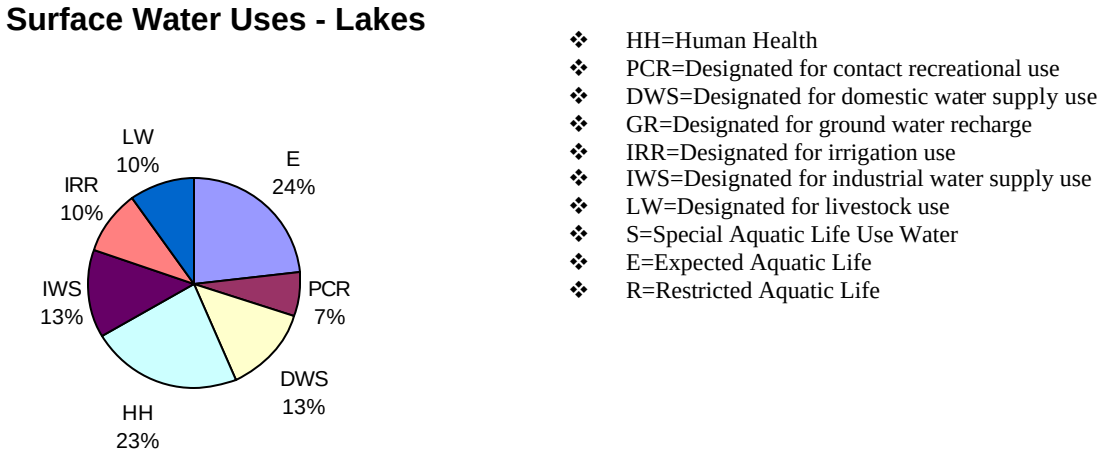
Lakes and Wetlands

Huc 8 10300101 is the home to Antioch Park Lake, Heritage Park Lake, South Park Lake as well as several other city and county lakes. These lakes are used for recreational purposes as well as a public water supply source for many local communities. See Attachment 2 for a map of lakes in HUC 8 10300101.

Designated Uses

According to the Surface Water Register, the majority of the lakes and wetlands in this watershed are designated for food procurement, expected aquatic use, domestic water supply, and industrial water supply.

Figure 4



TMDL/Contaminate Concerns

Surface waters not meeting their designated uses will require total maximum daily loads (TMDL)s. Approximately 43% of this watershed's lakes/wetlands sampled need TMDLs (Figure 5). Primary pollutants for this watershed's lakes and wetlands are eutrophication (E), low flow (HYDRO) and chloride (Cl). As shown below in Figure 6, approximately 33% of the impaired lakes/wetlands in this watershed are eutrophic, 33% have low flow and 34% are impaired by chloride.

Figure 5

Percentage of Lakes/Wetlands needing TMDL's

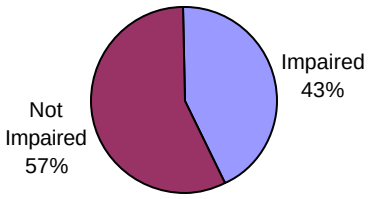
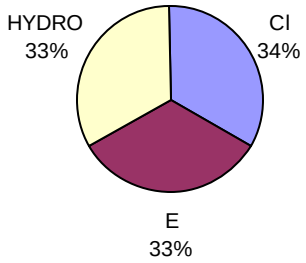


Figure 6

TMDL Pollutant Count - Lakes



Potential Pollution Sources

Based on the watershed's land use percentages, the primary pollutant sources for nutrients causing eutrophication may be row crop agriculture, livestock, feedlots, and septic systems. Eutrophication is a process caused by excess nutrient loading from a variety of nitrogen and phosphorus sources. Low flow is the lack of water flowing into a lake which can result in high water temperatures, low DO and stagnation. Low flow may be caused by irrigation and drought. Chloride is an inorganic mineral which may cause adverse water taste, deterioration of plumbing, and hypertension in humans. Chloride contamination can result from intrusion from deep parent material underlying the surface waters, or from low flow of water and irrigation.

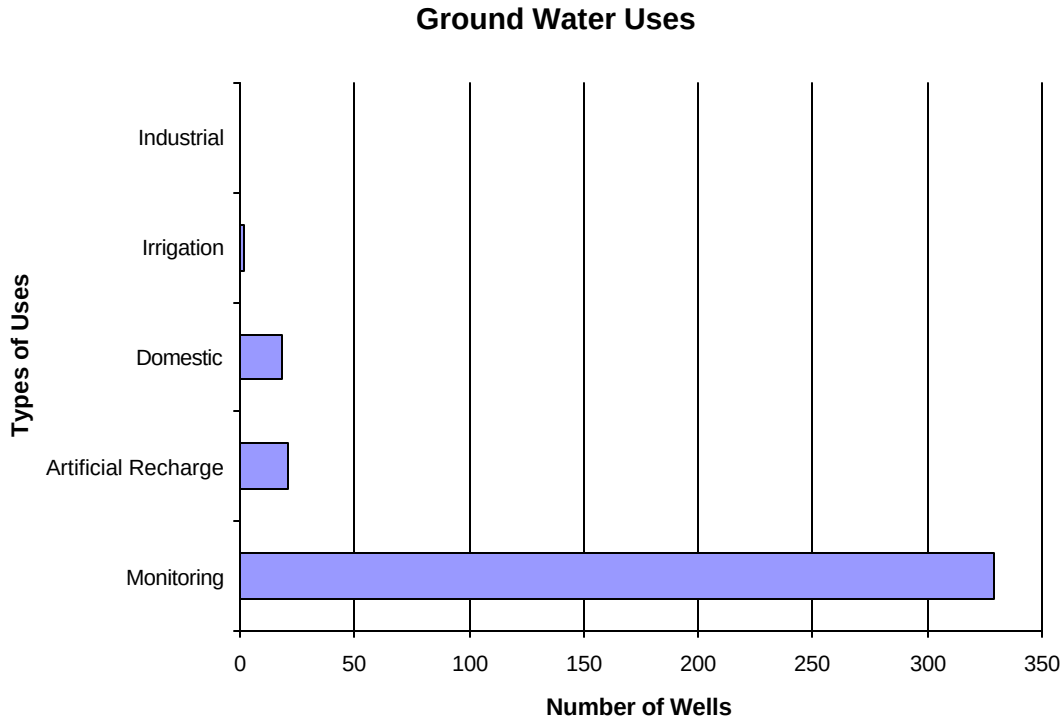
Groundwater

Major groundwater aquifers underlying this watershed include portions of the Glacial Drift aquifer in the bordering counties and a few alluvial aquifers from the many tributaries found in the watershed.

Designated Uses

There are approximately 371 groundwater wells located within the watershed. Water from these wells is used for groundwater monitoring, artificial recharge domestic use and irrigation (Figure 7). See attachment 4 for a map of groundwater aquifers.

Figure 7



Aquifer Characteristics

Alluvial Aquifer: Alluvial aquifers of the many streams and creeks exist throughout the watershed. Alluvial aquifers provide the primary water source for many public water supplies located with in the watershed. Water quality in alluvial aquifers is generally good; however nitrates, minerals, pesticides and bacteria can be pollutant concerns.

Glacial Drift Aquifer: The Glacial Drift aquifer underlies a small portion of this watershed. Water from this aquifer is used for rural, domestic and public water supply. Historically water from this aquifer is very hard with nitrates being one of the primary pollutant concerns.

Potential Pollution Types and Sources

Common groundwater pollutants include: nitrates, chloride, sulfates, bacteria and atrazine. Nitrate impaired groundwater is perhaps the most prevalent groundwater contamination problem in the State.

Nitrate: Nitrate is a naturally occurring compound and is an essential component of all living matter. However, high concentrations of nitrate in drinking water can cause adverse health effects including "blue baby" syndrome. Sources of nitrate include municipal waste water treatment plant discharges, runoff from livestock operations, leaching of fertilizer from urban and agricultural areas, and failing septic systems.

Chloride: Chloride is a naturally occurring mineral found in Kansas lakes, streams, and groundwater. In high concentrations, chloride can cause deterioration of domestic plumbing, water heaters, and municipal water works. The primary source of chloride impacted groundwater is intrusion of salt water from deeper formations, often due to improperly constructed water wells which allow confined aquifers to come into contact with each other.

Sulfates: Sulfate is a naturally occurring mineral that can cause taste and odor problems in drinking water. Sulfates are dissolved into groundwater as the water moves through various sulfur containing rock formations.

Bacteria: Fecal coliform bacteria are found in the digestive systems of warm blooded animals. In the environment coliform bacteria is an indicator of potential disease causing organisms. Potential sources of bacteria contamination in groundwater include livestock facilities, septic systems, pets, and wildlife. Many wells are impacted by bacteria due to improper construction which allows water from the surface to funnel directly into the well.

Ammonia: Ammonia is a chemical which is toxic to fish and aquatic organisms. Sources of ammonia are livestock, septic tanks, fertilizer, municipal and industrial waste.

TSS: TSS stands for Total Suspended Solids which are particles such as soil, algae, and finely divided plant material suspended in water. Sources of TSS are soil erosion from cropland, stream banks, or construction sites, and municipal and industrial waste.

VOCs: Volatile Organic Compounds, also called purgeable organics, are components of fuels and solvents. They are ingredients in many household and industrial products. Sources of VOCs are leaking fuel storage tanks, trash dumps, and some agricultural pesticides.

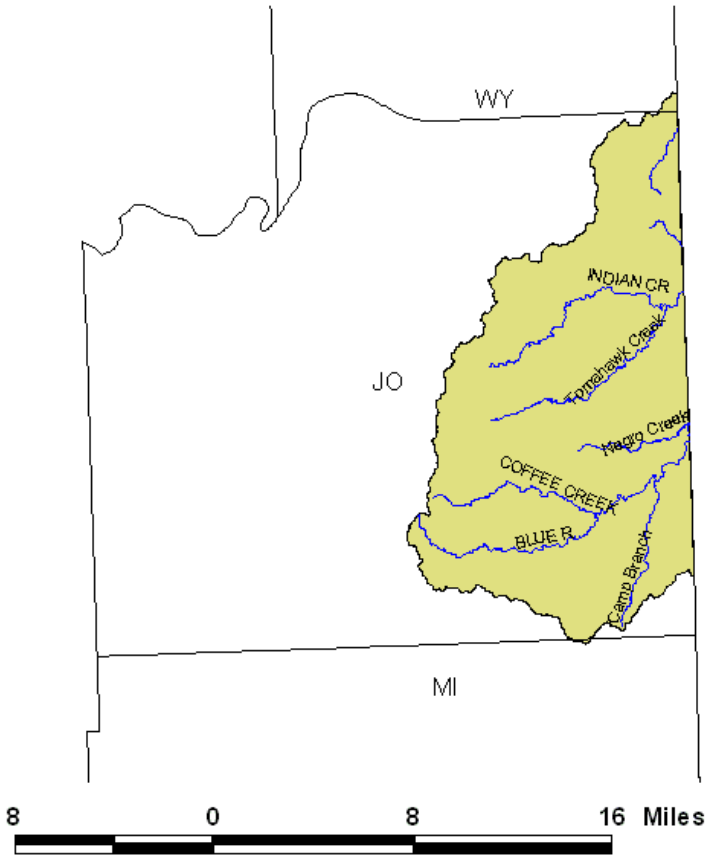
Iron: Iron is a naturally occurring element found in the soil throughout Kansas. It is an annoyance as it has an objectionable taste, causes a red stain to porcelain fixtures and laundry, and causes plumbing irritations.

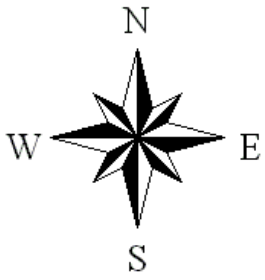
Manganese: Manganese is a naturally occurring element and causes an unpleasant taste in drinking water, stains porcelain and laundry, and collects deposits in plumbing. It is naturally occurring throughout the soils in the state.

Attachment 1

Maps

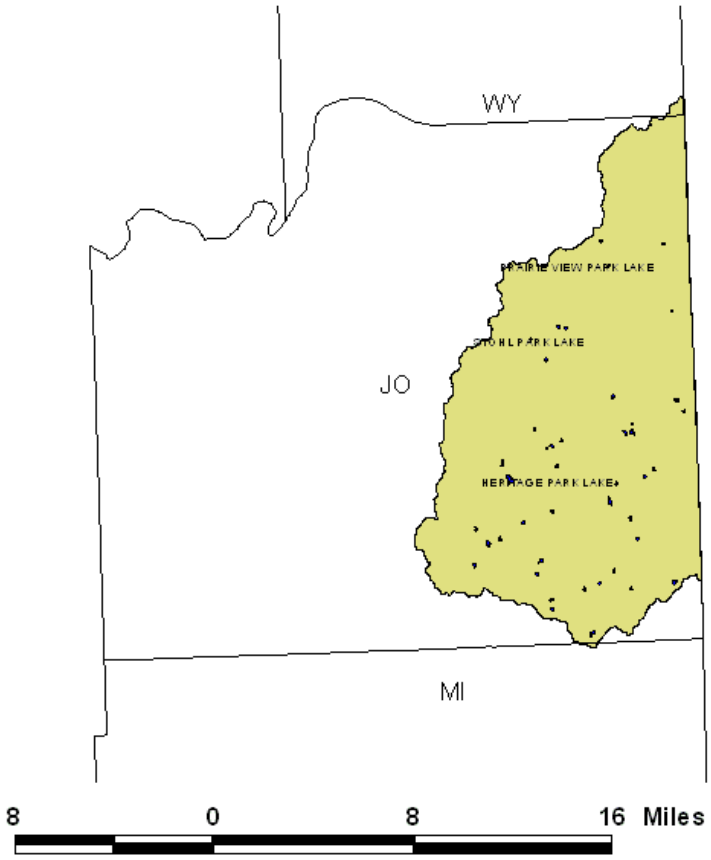
HUC 10300101 (Lower Missouri-Crooked Creek)
Streams and Rivers



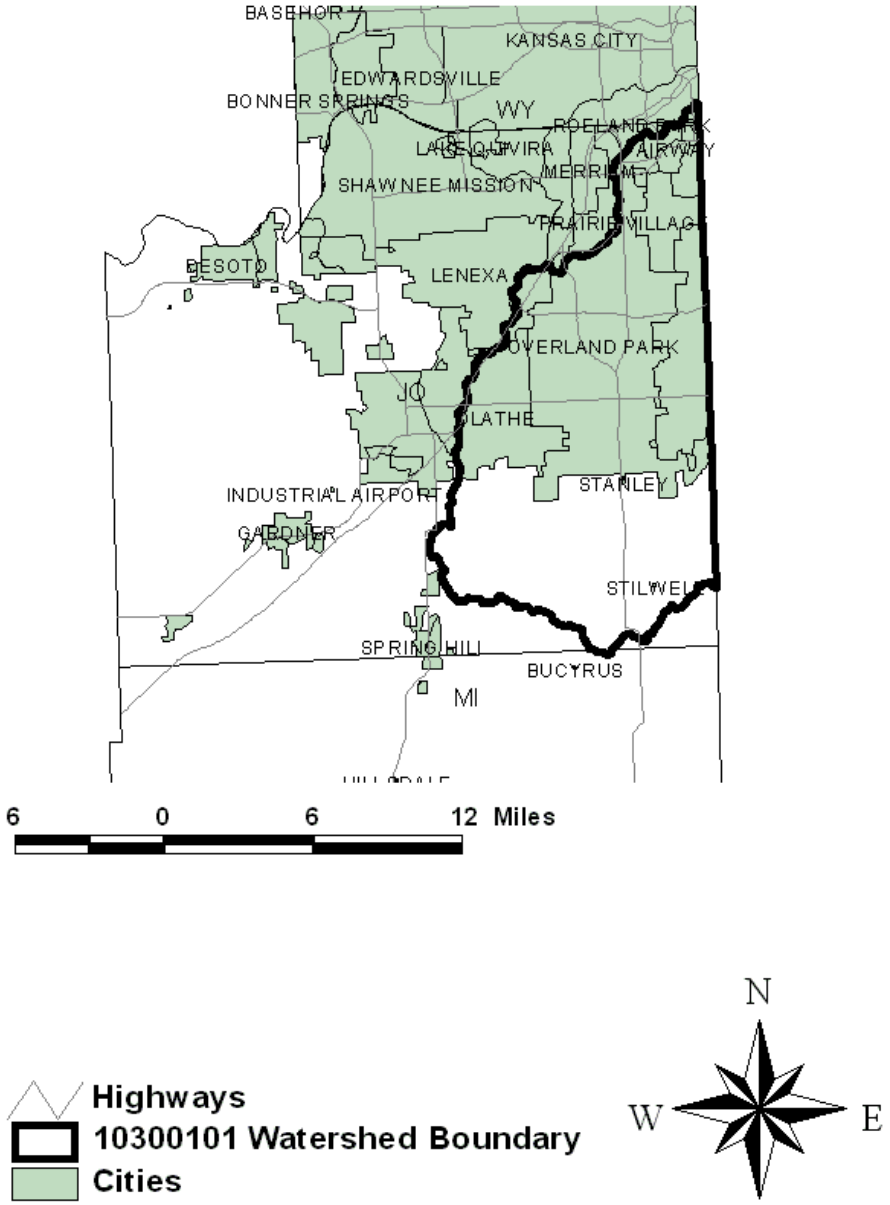


Streams and Rivers
Counties
10300101 Watershed Boundary

HUC 10300101 (Lower Missouri-Crooked Creek)
Lakes



HUC 10300101 (Lower Missouri-Crooked Creek) Watershed Boundaries



HUC 10300101 (Lower Missouri-Crooked Creek) Groundwater Aquifers